Chapter 3
Treatment of Various Types of Structures

3-1. Levees

Levees are usually constructed of rolled (compacted) earth fill. In some cases, internal drainage or underseepage treatment is incorporated into the levee. When landscaping and planting are provided on the existing levee, the internal blanket drain and/or toe drain will have to be extended, as shown in Figure 2-1. Designs for levees, except those to be located in agricultural and similar sparsely inhabited areas, shall meet the landscape planting criteria outlined in paragraph 3-1*a*. During design, landscape planting will also be considered for levees in the following areas: at pumping installations in public view, at public road crossings, near residences, and at other areas where planting could protect or restore the existing environmental values. Plantings will normally be located outside the limits of the basic structure (see Figure 2-1).

a. Urban levees. Since these structures are highly visible to large numbers of people, planting may be included for the total length of levees constructed in urban areas. Top soil and planting can be used for restoration of borrow and waste areas created during construction of levees.

b. Rural or agricultural levees. Although these structures are seen by relatively few people, environmental considerations should be included in the design. Planting should be considered for the following areas: at pumping installations in public view, at public road crossings, near residences, and at other areas where planting could protect or restore the existing environmental values. Planting and regrading appropriate for restoration should be considered for borrow and waste areas. Where opportunities exist, creation of higher value environments should be considered. Sand levees will be stabilized with native grass species.

3-2. Floodwalls

Floodwalls are generally used in those urban areas where land or materials required for levee construction are not economically available. These walls are subject to hydraulic forces on one side, which may be resisted by little or no earth loading forces on the other side. Although there are several types of floodwalls, the two most common are the inverted T-type reinforced concrete wall and the cantilever I-type sheet piling wall. Landscape planting should be included in the floodwall design, particularly for those walls that encroach upon or change existing scenic values, e.g., where the wall becomes a barrier along a street or near dwellings, parks, and commercial or industrial developments. Planting should also be considered for floodwalls constructed in areas adjacent to open tracts of land where it can be determined that development will occur during the early stages of the project life.

a. Inverted T-type reinforced concrete wall. This type of wall structure may have a toe drainage system to check and control piping and boils, control seepage as a result of roofing where piles are used, and control uplift pressures. These drainage systems must be protected from the invasion of roots, which could clog the drainage system. A vegetation- and root-free zone will be established at the top outside edge of the toe drains and at the landside face of wall joints when planting is included in the design. The possibility of eventual loosening and eroding of wall joint seals is a serious consideration in the design of planting at floodwalls. Wall joints must be protected against possible root penetration and resultant damage to the wall (see Figure 3-1).

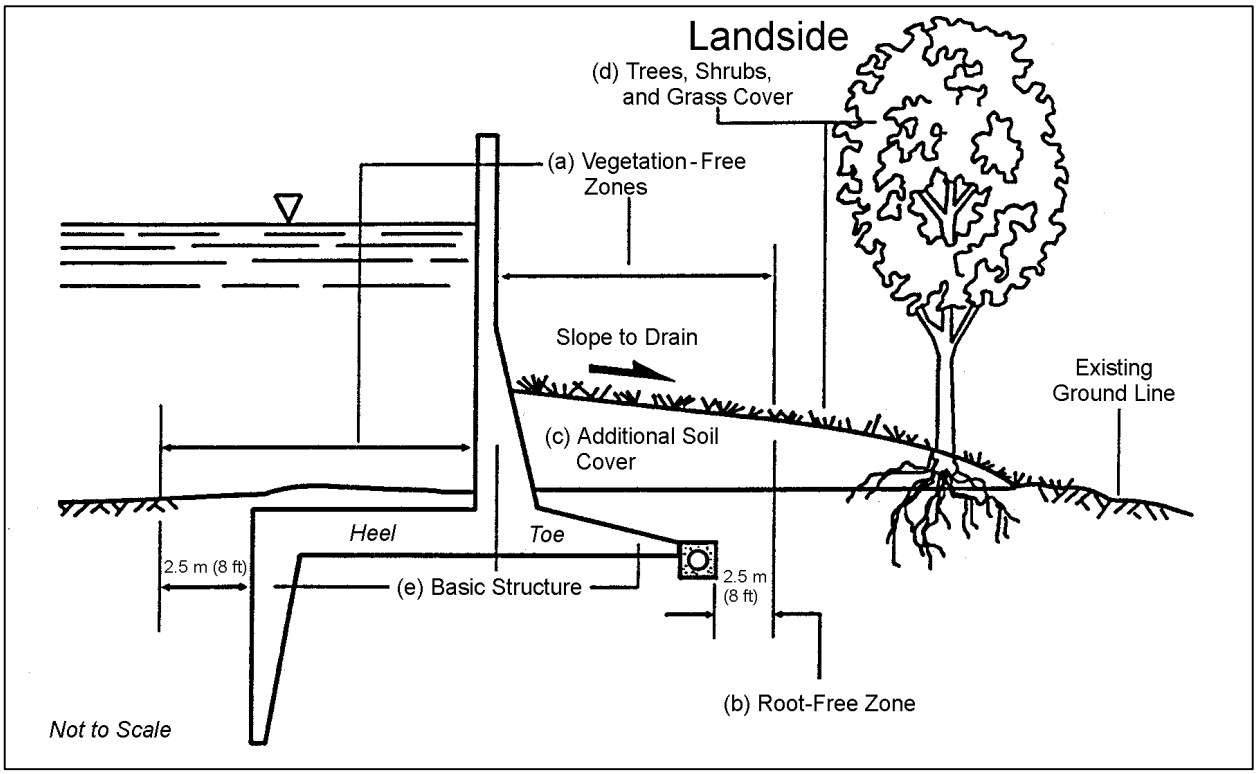

Figure 3-1. Inverted T-type floodwall showing (a) vegetation-free zone, (b) root-free zone (vertical joint occurring at section), (c) additional soil cover, (d) landscape planting of trees, shrubs, and grass, and (e) basic structure

b. Cantilever I-type sheet piling floodwall. Landscape planting at this type of wall should be designed similarly to that for the T-type wall. Vegetation- and root-free zones should be established for the structure, similar to those for T-type walls. A typical section of an I-type wall is shown in Figure 3-2.

3-3. Embankment Dams

Two general types of dams to be considered are earth dams and rock-fill dams. Usually, dams are constructed in rural areas and seldom encroach on urban areas. Where it is desirable to restore or enhance the damsite with tree and shrub plantings, these plantings should be designed to blend the structures with the natural surroundings. Restoration of borrow areas or other areas disturbed during construction should be considered in landscape planning.

a. Earth dams. Landscape planting will be confined to areas adjacent to the dam embankment. Because of the need for access at the downstream toe area by maintenance and construction equipment during periods of flooding, a 15-m (50-ft) vegetation-free zone will be maintained immediately downstream of the toe of the dam in the floodplain and on the abutments.

b. Rock-fill dams. Planting can be considered for all adjacent areas to blend the dam into the surroundings.

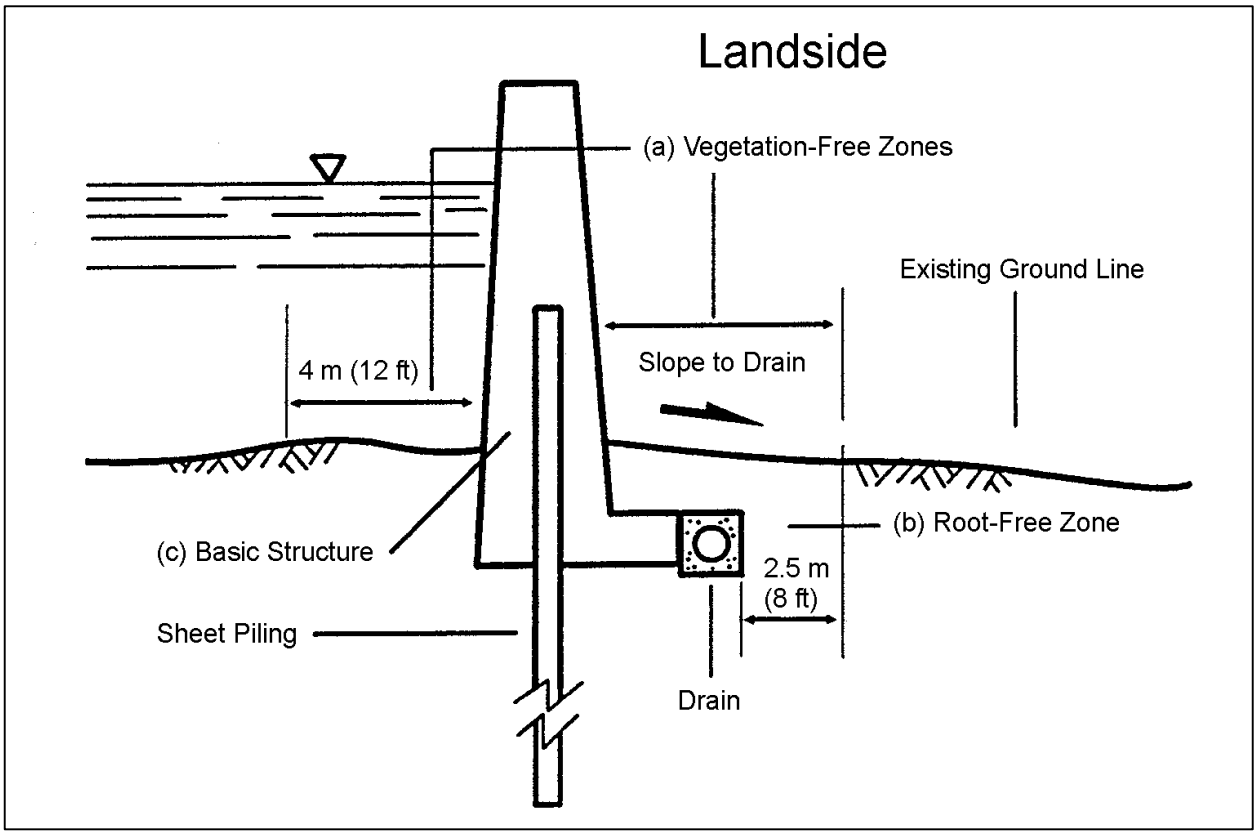

Figure 3-2. Cantilever I-type sheet piling floodwall showing (a) vegetation-free zone, (b) root-free zone (vertical joint occurring at section), and (c) basic structure